Claims:

1. A method of detecting double-talk and path changes in an echo cancellation system, comprising:

generating a correlation-based matrix of signals in said echo cancellation system; and

analyzing said correlation-based matrix to identify double-talk and path changes occurring in said system.

2. A method as claimed in claim 1, wherein said correlation-based matrix is generated using zero-lag auto and cross-correlations of said signals.

3. A method as claimed in claim 2, wherein a determinant of said matrix is used to detect said double-talk and path changes.

4. A method as claimed in claim 3, wherein said double-talk and path changes are inferred when the value of said determinant passes predetermined threshold values.

5. A method as claimed in claim 2, wherein eigendecompositions of said matrix are used to detect said double-talk and path changes.

6. A method as claimed in claim 2, wherein single valued decompositions of said matrix are used to detect said double-talk and path changes.

7. A method as claimed in claim 2, wherein condition numbers of said matrix are used to detect said double-talk and path changes.

8. A method as claimed in claim 1, wherein said echo cancellation system includes an adaptive filter, and said signals comprise an echo signal and an output of said adaptive filter.

9. A method as claimed in claim 8, wherein said filter is an LMS filter.

10. A method as claimed in claim 9, wherein said LMS filter implements a normalized-LMS algorithm.

11. A method as claimed in claim 1, wherein the elements of said correlation-based matrix are generated in the time domain.

12. A method as claimed in claim 1, wherein the elements of said correlation-based matrix are generated in the frequency domain.

13. A method as claimed in claim 3, wherein said determinant **R** is of the form

$$\mathbf{R} = E\begin{bmatrix} X_0 X_0^T & X_0 X_1^T \\ X_1 X_0^T & X_1 X_1^T \end{bmatrix}$$

wherein $X_0[n]$ and $X_1[n]$ are generated by a linear combination of two real-valued source signals, $S_0[n]$ and $S_1[n]$.

14. A method as claimed in claim 1, wherein $S_0[n]$ comprises an echo signal and $S_1[n]$ comprises a cancellation signal.

15. A double-talk and path change detector, comprising:

a processing element generating a correlation-based matrix of signals in said echo cancellation system; and

a processing element for analyzing said correlation-based matrix to identify double-talk and path changes occurring in said system.

16. A double-talk and path change detector as claimed in claim 15, wherein said correlation-based matrix is generated using zero-lag auto and cross-correlations of said signals.

17. A double-talk and path change detector as claimed in claim 16, wherein a determinant of said matrix is used to detect said double-talk and path changes.

18. A double-talk and path change detector as claimed in claim 16, wherein said double-talk and path changes are inferred when the value of said determinant passes predetermined threshold values.

19. A double-talk and path change detector as claimed in claim 16, wherein eigendecompositions of said matrix are used to detect said double-talk and path changes.

20. A double-talk and path change detector as claimed in claim 16, further comprising an adaptive filter, and said signals comprise an echo signal and an output of said adaptive filter.

21. A double-talk and path change detector as claimed in claim 20, wherein said filter is an LMS filter.

22. A double-talk and path change detector as claimed in claim 17, wherein said determinant (**R**) is of the form

$$\mathbf{R} = E\begin{bmatrix} X_0 X_0^T & X_0 X_1^T \\ X_1 X_0^T & X_1 X_1^T \end{bmatrix}$$

wherein $X_0[n]$ and $X_1[n]$ are generated by a linear combination of two real-valued source signals, $S_0[n]$ and $S_1[n]$.